



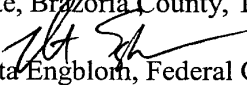
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS TX 75202-2733


SEP 13 2010

MEMORANDUM

SUBJECT: Request for a Time Critical Removal Action at the Gulfco Marine Maintenance Site, Brazoria County, Texas

FROM:  Rita Engblom, Federal On-Scene Coordinator
Superfund Removal Team (6SF-PR)

TO: Samuel Coleman, P.E., Director
Superfund Division (6SF)

THRU: *for* Mark Hansen, Acting Associate Director 
Prevention and Response Branch (6SF-P)

I. PURPOSE

This Memorandum requests approval of a Time Critical removal action in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. § 9604, at the Gulfco Marine Maintenance site (the "Site") located approximately three miles northeast of Freeport, in Brazoria County, Texas. The site consists of approximately 40 acres along the north bank of the Intracoastal Waterway. The time critical removal action is to address source material in deteriorating above ground storage tanks.

This action meets the criteria for initiating a removal action under Section 300.415 of the National Contingency Plan (NCP), 40 CFR § 300.415. This action is expected to require less than twelve months and \$2 million to complete.

II. SITE CONDITIONS AND BACKGROUND

CERCLIS ID#: TXD055144539
Category of Removal: Time-Critical
Site ID#: 06JZ
Latitude: 28.96684
Longitude: -95.28965



610769

A. Site Description

1. Removal Site Evaluation

The Gulfco Marine Maintenance facility operated as a barge cleaning and repair facility from 1971 through 1999 under several owners. Operations at the facility involved the cleaning, servicing and repair of various types of barges. Chemicals were drained and pumped from barges into Aboveground Storage Tanks (ASTs). Barges were then washed with water and/or a detergent solution. Generated wash waters were disposed of in barges and/or ASTs onsite.

Previous investigations at the Site have included:

- Phase I and II Investigations (1998 - 1999) – Phase I and II investigations conducted by the Potentially Responsible Parties (PRPs):
- LTE Site Characterization (1999) – In March 1999, the PRPs conducted an investigation of the Site, including the sampling of ASTs and drum contents, accumulated water within the former AST tank farm containment area, soils, residual sandblasting material, sediment from the fresh water pond, and groundwater.
- Screening Site Inspection (2000) – In cooperation with the Environmental Protection Agency (EPA), the Texas Commission on Environmental Quality (TCEQ), formerly the Texas Natural Resources and Conservation Commission (TNRCC) performed a Screening Site Inspection (SSI). The SSI included collection of onsite and offsite soil samples, Intracoastal Waterway sediment samples (adjacent to and distant from the Site), pond sediment samples and groundwater samples from existing monitoring wells.
- Expanded Site Inspection 2001 – In cooperation with EPA, TCEQ performed an Expanded Site Inspection (ESI) in January 2001. The ESI included collection of groundwater samples from temporary onsite and offsite monitoring wells.
- Gulfco Marine Maintenance, Inc., the Potentially Responsible Party (PRP) gauged and sampled ASTs in 2006. In accordance with an Administrative Settlement Agreement and Order on Consent for Removal Action (AOC) with the EPA, the RP gauged fluid levels and collected samples from ASTs for analysis. AST contents included water, various organic phases, oily sludges, and sand, rust solids, and debris. Analytical results from some ASTs indicated the presence of the following hazardous substances: chloroform, 1,1-dichloroethane, 1,2-dichloroethane, methylene chloride, tetrachloroethylene (PCE), 1,1,1-trichloroethane, 1,2,4-trimethylbenzene and trichloroethylene (TCE). Samples failed Total Characteristic Leaching Procedure (TCLP) for chloroform, benzene, 1,2-dichloroethane, PCE, TCE, and vinyl chloride.

Thirteen Potential Source Areas (PSAs) have been identified at the Site based on the history of the Site and previous investigations. Chemicals of Concern (COCs) include metals, Volatile Organic Compounds (VOCs), Semi-Volatile Organic Compounds (SVOCs), pesticides, and

polychlorinated biphenyls (PCBs).

On March 9, 2010, an EPA inspection identified time critical conditions at the Site. One of the fifteen tanks previously documented at the Site had been washed away by Hurricane Ike. Corrosion on some of the remaining tanks was resulting in complete penetration of the metal. Contents of some of these tanks have previously been documented as hazardous substances, including benzene, 1,2 dichloroethane, chloroform, heptachlor, tetrachloroethene, trichloroethene, and vinyl chloride.

2. Physical Location

The facility is located at 906 Marlin Avenue (also referred to as County Road 756) approximately three miles northeast of the city of Freeport, in Brazoria County, Texas (See Attachment 1). The Site is within the 100-year coastal flood plain along the north bank of the Intercoastal Waterway between Oyster Creek to the east and the Old Brazos River Channel and the Dow Barge Canal to the west. North of Marlin Avenue, drainage from the Site flows to the northeast into adjacent wetlands and Oyster Creek. The southern part of the Site drains to the south and enters the Intercoastal Waterway.

Approximately 78 people live within the one square mile area surrounding the Site. Approximately 3,392 people live within 50 square miles of the Site. The surrounding area is primarily industrial and commercial. A residential area is located approximately 300 feet west of the Site.

3. Site Characteristics

The Site is approximately 40 acres in size. The Gulfco Marine Maintenance, Inc. facility operated as a barge cleaning and repair facility from 1971 to 1999. As part of this operation, product heels were recovered from the barges and the barges were cleaned of waste oils, caustics and organic chemicals. Product and waste from the barge cleaning were stored in three surface impoundments and ASTs. An AST farm is located in the southern portion of the Site.

Marlin Avenue divides the Site into two primary areas (See Attachment 2). The property to the north of Marlin Avenue (the North Area) includes the closed surface impoundments. An AST farm is located at the Site south of Marlin Avenue. It consists of fourteen tanks of various sizes located within a concrete bermed area. The tanks contain water, various organic phases, oily sludges, and sand, rust solids, and debris. Sampling of AST contents has identified various hazardous substances including benzene, 1,2-dichloroethane, chloroform, heptachlor, tetrachloroethene, trichloroethene, and vinyl chloride.

4. Release or Threatened Release into the Environment of a Hazardous Substance, or Pollutant or Contaminant

Tanks contain hazardous substances including: benzene; chloroform; 1,2 dichloroethane; trichloroethylene; tetrachloroethylene; and vinyl chloride in various concentrations. These are

listed as hazardous substances pursuant to 40 CFR § 302.4. As such, they are hazardous substances as defined in Section 101(14) of the CERCLA, 42 U.S.C. § 9601(14).

5. NPL Status

The Gulfco Marine Site was proposed for placement on the National Priorities List (NPL) on September 5, 2002 and subsequently placed on the NPL on April 30, 2003.

6. Maps, pictures and other graphic representations

Attachment 1 Site Location Map

Attachment 2 Site Sketch

Attachment 3 ATSDR Fact Sheets

Attachment 4 Drainage Pathway

Attachment 5 Enforcement Addendum (Confidential EPA file)

B. Other Actions to Date

1. Previous Actions

The TCEQ in cooperation with the EPA conducted a Screening Site Inspection (2000) and an Expanded Site Inspection 2001. A Hazard Ranking Score (HRS) Documentation Record was prepared in 2002 for NPL listing of the Site.

2. Current Actions

A PRP is performing a Remedial Investigation/Feasibility Study (RI/FS) required by the Unilateral Administrative Order issued by the EPA. Once complete, the EPA will propose a final remedy to be published in a Record of Decision to address remaining PSAs at the Site.

C. State and Local Authorities' Roles

1. State and Local Actions to Date

The TCEQ provides support to the EPA in development of the RI/FS.

2. Potential for State/local Response

The TCEQ will provide assistance in oversight of this removal action.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

A. Threats to Public Health or Welfare

Section 300.415 of the NCP lists the factors to be considered in determining the appropriateness of a removal action. Paragraphs (b)(2)(i), (ii), (iii), and (iv) directly apply to the conditions at the Site. Any one of these factors may be sufficient to justify a removal action.

1. Exposure to Human Populations, Animals or the Food Chain, NCP Section 300.415.(b)(2)(i)

A number of CERCLA hazardous substances have been documented at the Site, at levels which fail TCLP, including benzene, chloroform and chlorinated hydrocarbons.

The predominant threat to human populations is the potential for exposure by direct contact with hazardous waste at the Site, including but not limited to benzene; chloroform; 1,2 dichloroethane; trichloroethylene; tetrachloroethylene; and vinyl chloride.

Potentially, a wide array of adverse human health effects could occur through the inhalation, ingestion, or dermal contact with chemicals onsite. Effects include minor to severe irritation of skin, mucous membrane, lung, and gastrointestinal tract; neurological effects; death from systemic effects and asphyxiation; blood effects; and cancer. Potential effects of some of the more toxic chemicals which are hazardous substances as defined at Section 101(14) of CERCLA, 42 U.S.C. § 9601(14), and further defined at 40 CFR § 302.4, are summarized below:

- a. Benzene – Benzene is a carcinogen. Systemic effects from exposure include irritation to mucous membranes, restlessness, convulsions, and depression.
 - b. Chloroform – Chloroform can cause dizziness, fatigue, and headache. Inhalation or ingestion of high levels of chloroform over time may damage liver and kidneys.
 - c. Trichloroethylene (TCE) - Breathing large amounts of trichloroethylene may cause impaired heart function, unconsciousness, and death. Breathing it for long periods may cause nerve, kidney, and liver damage.
 - d. Tetrachloroethylene (perchloroethylene) – PCE may be a carcinogen. High concentrations can cause dizziness, headache, sleepiness, confusion, nausea, difficulty in speaking and walking, unconsciousness, and death.
 - e. Vinyl chloride – Vinyl chloride is a carcinogen. Breathing high levels of vinyl chloride can cause you to feel dizzy or sleepy. Breathing very high levels can cause you to pass out, and breathing extremely high levels can cause death.
2. Contamination of Drinking Water Supplies or Sensitive Ecosystems, NCP Section 300.415(b)(2)(ii)

North of Marlin Avenue, drainage from the Site flows to the northeast into adjacent wetlands and Oyster Creek. The southern part of the Site drains to the south and enters the Intercoastal

Waterway. The Site is within the 100-year coastal flood plain along the north bank of the Intercoastal Waterway between Oyster Creek to the east and the Old Brazos River Channel and the Dow Barge Canal to the west. Sensitive ecosystems, including wetlands receiving drainage from the Site could be impacted by the toxic contaminants identified onsite.

3 Hazardous Substances or Pollutants or Contaminants in Drums, Barrels, Tanks, or Other Bulk Storage Containers, That May Pose a Threat of Release, Section 300.415 (b) (2) (iii)

A tank farm located in the Southern portion of the Site contains ASTs holding liquid and sludge/sediment waste. The ASTs contain water, various organic phases, oily sludges, and sand, rust solids, and debris. Lab analysis identified the following hazardous substances: benzene; chloroform; 1,2 dichloroethane; trichloroethylene; tetrachloroethylene; and vinyl chloride.

4. Weather Conditions That May Cause the Release or Migration of Hazardous Substances, NCP Section 300.415(b)(2)(v)

The area receives an average of 51 inches of rain annually. The contaminants are subject to migration by entrainment, windblown deposition and surface runoff. Located on the coast of Texas, the Site is subject to tropical depressions and hurricanes. In 2008, the Site received heavy rain and winds from Hurricane Ike.

B. Threats to the Environment

Areas of the Site north of Marlin Avenue drain to the northeast into emergent, estuarine, persistent, irregularly flooded wetlands. These wetlands are directly adjacent to the upland area of the surface impoundments on the north, east, and west. The overland segment distance from the surface impoundment to wetlands contiguous to Oyster Creek is less than 10 feet. These wetlands extend approximately 0.48 miles to Oyster Creek (See Attachment 4).

According to the USFWS, Threatened and Endangered Species for Brazoria County include: bald eagle, brown pelican, green sea turtle, hawksbill sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, loggerhead sea turtle, piping plover, and whooping crane.

IV. ENDANGERMENT DETERMINATION

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, or welfare, or the environment.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

1. Proposed Action Description

The following actions are proposed to address the present and future threats of hazardous substances from ASTs onsite:

- Prior to sampling or content removal, each AST will be gauged to verify the approximate content volume. For gauging and sampling purposes, the tanks will be accessed utilizing ladders and/or man lifts.
- Samples will be collected using dippers, sampling thieves and/or other sampling devices as appropriate depending on tank size, content type (solid or liquid) and content volume in order to obtain a representative sample. One representative sample will be collected from each tank waste stream. Containment area water and sludge samples will be collected directly from the containment areas using dippers, bailers, and/or other appropriate devices.
- The analytical suite for AST and accumulated sludge samples (if any) will be determined based on the requirements of the removal action contractor and/or the offsite waste management facility. Analytical data will be used to profile specific waste streams for disposal. All analytical data collected for this removal action shall be provided electronically to EPA.
- Remove and properly dispose of hazardous tank liquids and solids. Vacuum trucks, pumps, or similar equipment may be used to transfer contents as necessary.
- Water containing hazardous substances may be separated from oil/sludge phase, screened, and filtered.
- Decanted water from ASTs will be tested for COCs and compared to wastewater standards. If wastewater quality standards can be met, the effluent may be discharged in accordance with TCEQ permit requirements. If effluent does not meet wastewater quality standards, the water will be sent for offsite disposal.

All offsite transportation and disposal will be done in accordance with applicable U.S. Department of Transportation (USDOT) requirements and in compliance with the EPA's Offsite Rule. All requirements under the Occupational Safety and Health Act (OSHA) of 1970, 29 U.S.C. § 651 et seq., and under the laws of the State, approved under Section 18 of the Federal OSHA laws, as well as other applicable safety and health requirements, will be followed. Federal OSHA requirements include Hazardous Materials Operation, 29 CFR § 1910, as amended by 54 Fed. Reg. 9317 (March, 1989), all OSHA General Industry (29 CFR § 1910) and Construction (29 CFR § 1926) standards wherever they are applicable, as well as OSHA record keeping and reporting regulations, and the EPA regulations set forth in 40 CFR § 300, relating to the conduct of work at Superfund sites.

Other requirements under the OSHA of 1970, 29 U.S.C. § 651 et seq., and under the laws of a State with an approved equivalent worker safety program, as well as other applicable safety and health requirements, will be followed. Federal OSHA requirements include, among other things, Hazardous Materials Operation, 20 CFR § 1910, as amended by 54 Fed. Reg. 9317 (March 1989), all OSHA General Industry (29 CFR § 1910) and Construction (29 CFR § 1926) standards wherever they are relevant, as well as OSHA record keeping and reporting regulations, and the EPA regulations set forth in 40 CFR § 300 relating to the conduct of work at Superfund sites.

2. Contribution to Remedial Performance

Because this action constitutes source control, these actions are cost effective and consistent with long term remediation strategies that may be developed for the Site.

3. Description of Alternative Technologies

The proposed action includes removal and offsite disposal of the chemical wastes that pose the highest risk to public health. No alternatives technologies can be applied to these portions of the cleanup.

4. Applicable or Relevant and Appropriate Requirements (ARARs)

This removal action will be conducted to abate the actual or potential release of a hazardous substance, pollutant, or contaminant to the environment, in accordance with CERCLA, 42 U.S.C. § 9601 et seq., and in a manner consistent with the National Contingency Plan, 40 CFR § 300, as required at 33 U.S.C. § 1321(c)(3) and 42 U.S.C. § 9604 (a)(1). As stated at 40 CFR § 300.415(j), fund-financed removal actions under CERCLA Section 104 and removal actions under CERCLA Section 106 shall, to the extent practicable considering the exigencies of the situation, attain the ARARs under Federal environmental law.

The Resource Conservation and Recovery Act (RCRA) waste analysis requirements found at 40 CFR § 261.20 and 261.30, RCRA's manifesting requirements found at 40 CFR § 262.20, and RCRA packaging and labeling requirements found at 40 CFR § 262.30 are ARARs for this removal action. Because onsite storage of hazardous wastes will not exceed ninety days, specific storage requirements found at 40 CFR § 265 are not ARARs (See 40 CFR § 262.34).

5. Project Schedule

After the Action Memorandum is signed, it is anticipated that the cleanup action will commence within 30 days. Total project length will be approximately 90 days.

B. Estimated Costs

This action is expected to be performed by the RP at an estimated cost of \$540,000. The estimated cost of oversight of this action is approximately \$30,000.

ESTIMATED COSTS

Extramural Costs

ERRS \$ N/A

START \$ 15,000

Intramural Costs

EPA Regional Direct Costs \$ 13,000

EPA Regional Indirect Costs \$ 2,000

TOTAL, CERCLA REMOVAL PROJECT CEILING..... \$ 30,000

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

The proposed actions for the Gulfco Marine Maintenance site should be taken immediately. Should these actions be delayed, the potential threats to human health and the environment will increase.

VII. OUTSTANDING POLICY ISSUES

None.

VIII. ENFORCEMENT

See attached confidential Enforcement Attachment (See Attachment 5).

IX. RECOMMENDATION

This decision document represents the selected removal action for the Gulfco Marine Maintenance site in Brazoria County, Texas, developed in accordance with CERCLA, 42 U.S.C. § 9601 et seq., and consistent with the NCP, 40 CFR § 300. This decision is based on the administrative record for the Site.

Conditions at the Site meet the NCP section 300.415(b)(2) criteria for a removal and I recommend your approval of the proposed removal action. The total project ceiling, if approved, will be \$30,000.00. None of this funding will come from the Regional removal allowance.

Approved:

 Date: 9/13/10
Samuel Coleman, P.E., Director
Superfund Division

Attachments

MEMORANDUM

SEP 13 2010

SUBJECT: Request for a Time Critical Removal Action at the Gulfco Marine Maintenance Site, Brazoria County, Texas

FROM: Rita Engblom, Federal On-Scene Coordinator
Superfund Removal Team (6SF-PR)

TO: Samuel Coleman, P.E., Director
Superfund Division (6SF)

THRU: Mark Hansen, Acting Associate Director
Prevention and Response Branch (6SF-P)

I. PURPOSE

This Memorandum requests approval of a Time Critical removal action in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. § 9604, at the Gulfco Marine Maintenance site (the "Site") located approximately three miles northeast of Freeport, in Brazoria County, Texas. The site consists of approximately 40 acres along the north bank of the Intracoastal Waterway. The time critical removal action is to address source material in deteriorating above ground storage tanks.

This action meets the criteria for initiating a removal action under Section 300.415 of the National Contingency Plan (NCP), 40 CFR § 300.415. This action is expected to require less than twelve months and \$2 million to complete.

II. SITE CONDITIONS AND BACKGROUND

CERCLIS ID#: TXD055144539
Category of Removal: Time-Critical
Site ID#: 06JZ
Latitude: 28.96684
Longitude: -95.28965

Engblom	Webster	Petersen/Hansen	Miller	Shade	Johnson	Nann	Peycke
6SF-P	6SF-PR	6SF-P	6SF-RA	6SF-TE	6SF-TE	6SF-RC	6SF-RC
6/18/10	8/10/10	8/27/10	6/21/10	8/10/10	8/10/10	8/12/10	8/12/10

ATTACHMENT 1

Site Location Map

Request for a Time Critical Removal Action at the Gulfco Marine Maintenance Superfund Site



*Protecting Texas by
Reducing and
Preventing Pollution*

Gulfco Marine
Maintenance
TXD #055144539



0.3 0 0.3 0.6 Miles

Legend



Area of Observed Contamination
associated with Source No. 1



Drainage Pathway from
Area of Observed Contamination

Source (for DOQQ)

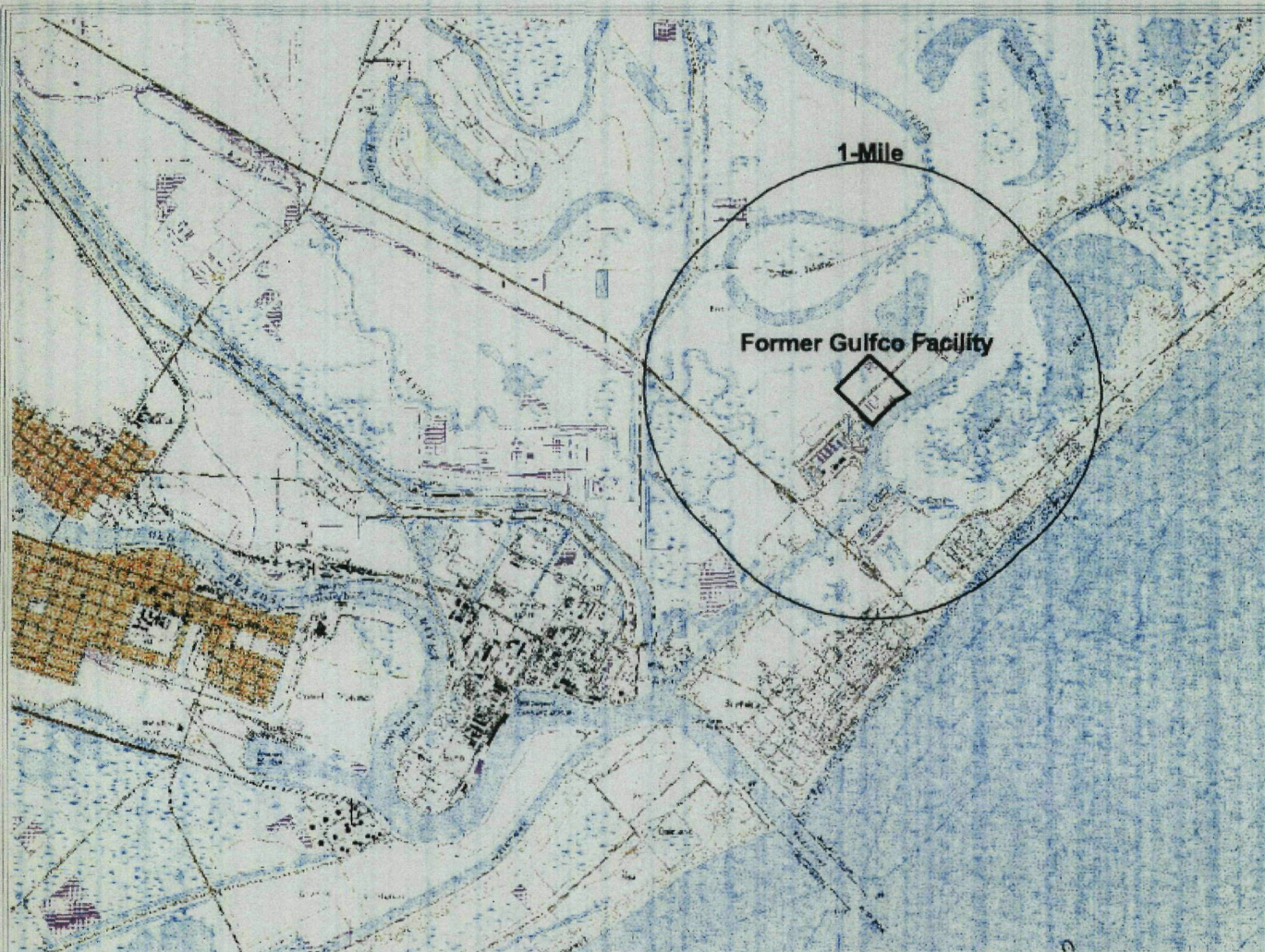
The base data set used is the Freeport Northeast Digital Orthoquarter Quad (DOQQ), which is a digital version of an aerial photograph. This DOQQ was produced by the TNRCC using USGS guidelines. UTM NAD 83 Zone # 15

Figure 9

ATTACHMENT 2

Site Sketch

Request for a Time Critical Removal Action at the Gulfco Marine Maintenance Superfund Site



Legend

Source (for DRG)



Distance from facility

The base data set used is the Freeport, Texas Digital Raster Graphic (DRG), which is a scanned image of a U.S. Geological Survey topographic map. UTM NAD 27 Zone # 15

ATTACHMENT 3

ATSDR Fact Sheets

- 1. Benzene**
- 2. Chloroform**
- 3. Tetrachloroethylene**
- 4. Trichloroethylene**

This fact sheet answers the most frequently asked health questions (FAQs) about benzene. For more information, call the ATSDR Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Benzene is a widely used chemical formed from both natural processes and human activities. Breathing benzene can cause drowsiness, dizziness, and unconsciousness; long-term benzene exposure causes effects on the bone marrow and can cause anemia and leukemia. Benzene has been found in at least 1,000 of the 1,684 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is benzene?

Benzene is a colorless liquid with a sweet odor. It evaporates into the air very quickly and dissolves slightly in water. It is highly flammable and is formed from both natural processes and human activities.

Benzene is widely used in the United States; it ranks in the top 20 chemicals for production volume. Some industries use benzene to make other chemicals which are used to make plastics, resins, and nylon and other synthetic fibers. Benzene is also used to make some types of rubbers, lubricants, dyes, detergents, drugs, and pesticides. Natural sources of benzene include emissions from volcanoes and forest fires. Benzene is also a natural part of crude oil, gasoline, and cigarette smoke.

What happens to benzene when it enters the environment?

- ☐ Industrial processes are the main source of benzene in the environment.
- ☐ Benzene can pass into the air from water and soil.
- ☐ It reacts with other chemicals in the air and breaks down within a few days.
- ☐ Benzene in the air can attach to rain or snow and be carried back down to the ground.

- ☐ It breaks down more slowly in water and soil, and can pass through the soil into underground water.
- ☐ Benzene does not build up in plants or animals.

How might I be exposed to benzene?

- ☐ Outdoor air contains low levels of benzene from tobacco smoke, automobile service stations, exhaust from motor vehicles, and industrial emissions.
- ☐ Vapors (or gases) from products that contain benzene, such as glues, paints, furniture wax, and detergents, can also be a source of exposure.
- ☐ Air around hazardous waste sites or gas stations will contain higher levels of benzene.
- ☐ Working in industries that make or use benzene.

How can benzene affect my health?

Breathing very high levels of benzene can result in death, while high levels can cause drowsiness, dizziness, rapid heart rate, headaches, tremors, confusion, and unconsciousness. Eating or drinking foods containing high levels of benzene can cause vomiting, irritation of the stomach, dizziness, sleepiness, convulsions, rapid heart rate, and death.

The major effect of benzene from long-term exposure is on the blood. Benzene causes harmful effects on the bone

ToxFAQs™ Internet address is <http://www.atsdr.cdc.gov/toxfaq.html>

marrow and can cause a decrease in red blood cells leading to anemia. It can also cause excessive bleeding and can affect the immune system, increasing the chance for infection.

Some women who breathed high levels of benzene for many months had irregular menstrual periods and a decrease in the size of their ovaries, but we do not know for certain that benzene caused the effects. It is not known whether benzene will affect fertility in men.

How likely is benzene to cause cancer?

Long-term exposure to high levels of benzene in the air can cause leukemia, particularly acute myelogenous leukemia, often referred to as AML. This is a cancer of the blood-forming organs. The Department of Health and Human Services (DHHS) has determined that benzene is a known carcinogen. The International Agency for Research on Cancer (IARC) and the EPA have determined that benzene is carcinogenic to humans.

How can benzene affect children?

Children can be affected by benzene exposure in the same ways as adults. It is not known if children are more susceptible to benzene poisoning than adults.

Benzene can pass from the mother's blood to a fetus. Animal studies have shown low birth weights, delayed bone formation, and bone marrow damage when pregnant animals breathed benzene.

How can families reduce the risks of exposure to benzene?

Benzene exposure can be reduced by limiting contact with gasoline and cigarette smoke. Families are encouraged not to

smoke in their house, in enclosed environments, or near their children.

Is there a medical test to determine whether I've been exposed to benzene?

Several tests can show if you have been exposed to benzene. There is a test for measuring benzene in the breath; this test must be done shortly after exposure. Benzene can also be measured in the blood; however, since benzene disappears rapidly from the blood, this test is only useful for recent exposures.

In the body, benzene is converted to products called metabolites. Certain metabolites can be measured in the urine. The metabolite S-phenylmercapturic acid in urine is a sensitive indicator of benzene exposure. However, this test must be done shortly after exposure and is not a reliable indicator of how much benzene you have been exposed to, since the metabolites may be present in urine from other sources.

Has the federal government made recommendations to protect human health?

The EPA has set the maximum permissible level of benzene in drinking water at 5 parts benzene per billion parts of water (5 ppb).

The Occupational Safety and Health Administration (OSHA) has set limits of 1 part benzene per million parts of workplace air (1 ppm) for 8 hour shifts and 40 hour work weeks.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Toxicological Profile for Benzene (Update). Atlanta, GA: U.S. Department of Public Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Environmental Medicine, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-800-232-4636, FAX: 770-488-4178. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



This fact sheet answers the most frequently asked health questions (FAQs) about chloroform. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to chloroform can occur when breathing contaminated air or when drinking or touching the substance or water containing it. Breathing chloroform can cause dizziness, fatigue, and headaches. Breathing chloroform or ingesting chloroform over long periods of time may damage your liver and kidneys. It can cause sores if large amounts touch your skin. This substance has been found in at least 717 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is chloroform?

(Pronounced klôr'ə-fôrm')

Chloroform is a colorless liquid with a pleasant, nonirritating odor and a slightly sweet taste. It will burn only when it reaches very high temperatures.

In the past, chloroform was used as an inhaled anesthetic during surgery, but it isn't used that way today. Today, chloroform is used to make other chemicals and can also be formed in small amounts when chlorine is added to water.

Other names for chloroform are trichloromethane and methyl trichloride.

What happens to chloroform when it enters the environment?

- ☐ Chloroform evaporates easily into the air.
- ☐ Most of the chloroform in air breaks down eventually, but it is a slow process.
- ☐ The breakdown products in air include phosgene and hydrogen chloride, which are both toxic.
- ☐ It doesn't stick to soil very well and can travel through soil to groundwater.

- ☐ Chloroform dissolves easily in water and some of it may break down to other chemicals.
- ☐ Chloroform lasts a long time in groundwater.
- ☐ Chloroform doesn't appear to build up in great amounts in plants and animals.

How might I be exposed to chloroform?

- ☐ Drinking water or beverages made using water containing chloroform.
- ☐ Breathing indoor or outdoor air containing it, especially in the workplace.
- ☐ Eating food that contains it.
- ☐ Skin contact with chloroform or water that contains it, such as in swimming pools.

How can chloroform affect my health?

Breathing about 900 parts of chloroform per million parts air (900 ppm) for a short time can cause dizziness, fatigue, and headache. Breathing air, eating food, or drinking water containing high levels of chloroform for long periods of time may damage your liver and kidneys. Large amounts of chloroform can cause sores when chloroform touches your skin.

ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>

It isn't known whether chloroform causes reproductive effects or birth defects in people.

Animal studies have shown that miscarriages occurred in rats and mice that breathed air containing 30 to 300 ppm chloroform during pregnancy and also in rats that ate chloroform during pregnancy. Offspring of rats and mice that breathed chloroform during pregnancy had birth defects. Abnormal sperm were found in mice that breathed air containing 400 ppm chloroform for a few days.

How likely is chloroform to cause cancer?

The Department of Health and Human Services (DHHS) has determined that chloroform may reasonably be anticipated to be a carcinogen.

Rats and mice that ate food or drank water with chloroform developed cancer of the liver and kidneys.

Is there a medical test to show whether I've been exposed to chloroform?

Although the amounts of chloroform in the air that you exhale and in blood, urine, and body tissues can be measured, there is no reliable test to determine how much chloroform you have been exposed to or whether you will experience any harmful effects.

The measurement of chloroform in body fluids and tissues may help to determine if you have come into contact with large amounts of chloroform, but these tests are useful for only a short time after you are exposed. Chloroform in your body might also indicate that you have come into contact with other chemicals.

Has the federal government made recommendations to protect human health?

The EPA drinking water limit for total trihalomethanes, a class of chemicals that includes chloroform, is 100 micrograms per liter of water (100 µg/L).

The EPA requires that spills or accidental releases of 10 pounds or more of chloroform into the environment be reported to the EPA.

The Occupational Safety and Health Administration (OSHA) has set the maximum allowable concentration of chloroform in workroom air during an 8-hour workday in a 40-hour workweek at 50 ppm.

Glossary

Carcinogenicity: A substance with the ability to cause cancer.

CAS: Chemical Abstracts Service.

Ingesting: Taking food or drink into your body.

Microgram (µg): One millionth of a gram.

Miscarriage: Pregnancy loss.

ppm: Parts per million.

References

This ToxFAQs information is taken from the 1997 Toxicological Profile for Chloroform (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



This fact sheet answers the most frequently asked health questions (FAQs) about tetrachloroethylene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Tetrachloroethylene is a manufactured chemical used for dry cleaning and metal degreasing. Exposure to very high concentrations of tetrachloroethylene can cause dizziness, headaches, sleepiness, confusion, nausea, difficulty in speaking and walking, unconsciousness, and death. Tetrachloroethylene has been found in at least 771 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is tetrachloroethylene?

(Pronounced tět'rə-klôr' ð-ěth'ə-lēn')

Tetrachloroethylene is a manufactured chemical that is widely used for dry cleaning of fabrics and for metal-degreasing. It is also used to make other chemicals and is used in some consumer products.

Other names for tetrachloroethylene include perchloroethylene, PCE, and tetrachloroethene. It is a nonflammable liquid at room temperature. It evaporates easily into the air and has a sharp, sweet odor. Most people can smell tetrachloroethylene when it is present in the air at a level of 1 part tetrachloroethylene per million parts of air (1 ppm) or more, although some can smell it at even lower levels.

What happens to tetrachloroethylene when it enters the environment?

- ☐ Much of the tetrachloroethylene that gets into water or soil evaporates into the air.
- ☐ Microorganisms can break down some of the tetrachloroethylene in soil or underground water.
- ☐ In the air, it is broken down by sunlight into other chemicals or brought back to the soil and water by rain.
- ☐ It does not appear to collect in fish or other animals that live in water.

How might I be exposed to tetrachloroethylene?

- ☐ When you bring clothes from the dry cleaners, they will release small amounts of tetrachloroethylene into the air.
- ☐ When you drink water containing tetrachloroethylene, you are exposed to it.

How can tetrachloroethylene affect my health?

High concentrations of tetrachloroethylene (particularly in closed, poorly ventilated areas) can cause dizziness, headache, sleepiness, confusion, nausea, difficulty in speaking and walking, unconsciousness, and death.

Irritation may result from repeated or extended skin contact with it. These symptoms occur almost entirely in work (or hobby) environments when people have been accidentally exposed to high concentrations or have intentionally used tetrachloroethylene to get a "high."

In industry, most workers are exposed to levels lower than those causing obvious nervous system effects. The health effects of breathing in air or drinking water with low levels of tetrachloroethylene are not known.

Results from some studies suggest that women who work in dry cleaning industries where exposures to tetrachloroethyl-

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ene can be quite high may have more menstrual problems and spontaneous abortions than women who are not exposed. However, it is not known if tetrachloroethylene was responsible for these problems because other possible causes were not considered.

Results of animal studies, conducted with amounts much higher than those that most people are exposed to, show that tetrachloroethylene can cause liver and kidney damage. Exposure to very high levels of tetrachloroethylene can be toxic to the unborn pups of pregnant rats and mice. Changes in behavior were observed in the offspring of rats that breathed high levels of the chemical while they were pregnant.

How likely is tetrachloroethylene to cause cancer?

The Department of Health and Human Services (DHHS) has determined that tetrachloroethylene may reasonably be anticipated to be a carcinogen. Tetrachloroethylene has been shown to cause liver tumors in mice and kidney tumors in male rats.

Is there a medical test to show whether I've been exposed to tetrachloroethylene?

One way of testing for tetrachloroethylene exposure is to measure the amount of the chemical in the breath, much the same way breath-alcohol measurements are used to determine the amount of alcohol in the blood.

Because it is stored in the body's fat and slowly released into the bloodstream, tetrachloroethylene can be detected in the breath for weeks following a heavy exposure.

Tetrachloroethylene and trichloroacetic acid (TCA), a breakdown product of tetrachloroethylene, can be detected in the blood. These tests are relatively simple to perform. These tests aren't available at most doctors' offices, but can be per-

formed at special laboratories that have the right equipment.

Because exposure to other chemicals can produce the same breakdown products in the urine and blood, the tests for breakdown products cannot determine if you have been exposed to tetrachloroethylene or the other chemicals.

Has the federal government made recommendations to protect human health?

The EPA maximum contaminant level for the amount of tetrachloroethylene that can be in drinking water is 0.005 milligrams tetrachloroethylene per liter of water (0.005 mg/L).

The Occupational Safety and Health Administration (OSHA) has set a limit of 100 ppm for an 8-hour workday over a 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) recommends that tetrachloroethylene be handled as a potential carcinogen and recommends that levels in workplace air should be as low as possible.

Glossary

Carcinogen: A substance with the ability to cause cancer.

CAS: Chemical Abstracts Service.

Milligram (mg): One thousandth of a gram.

Nonflammable: Will not burn.

References

This ToxFAQs information is taken from the 1997 Toxicological Profile for Tetrachloroethylene (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html> ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



This fact sheet answers the most frequently asked health questions (FAQs) about trichloroethylene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Trichloroethylene is a colorless liquid which is used as a solvent for cleaning metal parts. Drinking or breathing high levels of trichloroethylene may cause nervous system effects, liver and lung damage, abnormal heartbeat, coma, and possibly death. Trichloroethylene has been found in at least 852 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is trichloroethylene?

Trichloroethylene (TCE) is a nonflammable, colorless liquid with a somewhat sweet odor and a sweet, burning taste. It is used mainly as a solvent to remove grease from metal parts, but it is also an ingredient in adhesives, paint removers, typewriter correction fluids, and spot removers.

Trichloroethylene is not thought to occur naturally in the environment. However, it has been found in underground water sources and many surface waters as a result of the manufacture, use, and disposal of the chemical.

What happens to trichloroethylene when it enters the environment?

- ☐ Trichloroethylene dissolves a little in water, but it can remain in ground water for a long time.
- ☐ Trichloroethylene quickly evaporates from surface water, so it is commonly found as a vapor in the air.
- ☐ Trichloroethylene evaporates less easily from the soil than from surface water. It may stick to particles and remain for a long time.
- ☐ Trichloroethylene may stick to particles in water, which will cause it to eventually settle to the bottom sediment.
- ☐ Trichloroethylene does not build up significantly in

plants and animals.

How might I be exposed to trichloroethylene?

- ☐ Breathing air in and around the home which has been contaminated with trichloroethylene vapors from shower water or household products such as spot removers and typewriter correction fluid.
- ☐ Drinking, swimming, or showering in water that has been contaminated with trichloroethylene.
- ☐ Contact with soil contaminated with trichloroethylene, such as near a hazardous waste site.
- ☐ Contact with the skin or breathing contaminated air while manufacturing trichloroethylene or using it at work to wash paint or grease from skin or equipment.

How can trichloroethylene affect my health?

Breathing small amounts may cause headaches, lung irritation, dizziness, poor coordination, and difficulty concentrating.

Breathing large amounts of trichloroethylene may cause impaired heart function, unconsciousness, and death. Breathing it for long periods may cause nerve, kidney, and liver damage.

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Drinking large amounts of trichloroethylene may cause nausea, liver damage, unconsciousness, impaired heart function, or death.

Drinking small amounts of trichloroethylene for long periods may cause liver and kidney damage, impaired immune system function, and impaired fetal development in pregnant women, although the extent of some of these effects is not yet clear.

Skin contact with trichloroethylene for short periods may cause skin rashes.

How likely is trichloroethylene to cause cancer?

Some studies with mice and rats have suggested that high levels of trichloroethylene may cause liver, kidney, or lung cancer. Some studies of people exposed over long periods to high levels of trichloroethylene in drinking water or in workplace air have found evidence of increased cancer. Although, there are some concerns about the studies of people who were exposed to trichloroethylene, some of the effects found in people were similar to effects in animals.

In its 9th Report on Carcinogens, the National Toxicology Program (NTP) determined that trichloroethylene is "reasonably anticipated to be a human carcinogen." The International Agency for Research on Cancer (IARC) has determined that trichloroethylene is "probably carcinogenic to humans."

Is there a medical test to show whether I've been exposed to trichloroethylene?

If you have recently been exposed to trichloroethylene, it can be detected in your breath, blood, or urine. The breath test, if it is performed soon after exposure, can tell if you have been exposed to even a small amount of trichloroethylene.

Exposure to larger amounts is assessed by blood

and urine tests, which can detect trichloroethylene and many of its breakdown products for up to a week after exposure. However, exposure to other similar chemicals can produce the same breakdown products, so their detection is not absolute proof of exposure to trichloroethylene. This test isn't available at most doctors' offices, but can be done at special laboratories that have the right equipment.

Has the federal government made recommendations to protect human health?

The EPA has set a maximum contaminant level for trichloroethylene in drinking water at 0.005 milligrams per liter (0.005 mg/L) or 5 parts of TCE per billion parts water.

The EPA has also developed regulations for the handling and disposal of trichloroethylene.

The Occupational Safety and Health Administration (OSHA) has set an exposure limit of 100 parts of trichloroethylene per million parts of air (100 ppm) for an 8-hour workday, 40-hour workweek.

Glossary

Carcinogenicity: The ability of a substance to cause cancer.

CAS: Chemical Abstracts Service.

Evaporate: To change into a vapor or gas.

Milligram (mg): One thousandth of a gram.

Nonflammable: Will not burn.

ppm: Parts per million.

Sediment: Mud and debris that have settled to the bottom of a body of water.

Solvent: A chemical that dissolves other substances.

References

This ToxFAQs information is taken from the 1997 Toxicological Profile for Trichloroethylene (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs™ Internet address is <http://www.atsdr.cdc.gov/toxfaq.html>. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATTACHMENT 4

Drainage Pathway

Request for a Time Critical Removal Action at the Gulfco Marine Maintenance Superfund Site

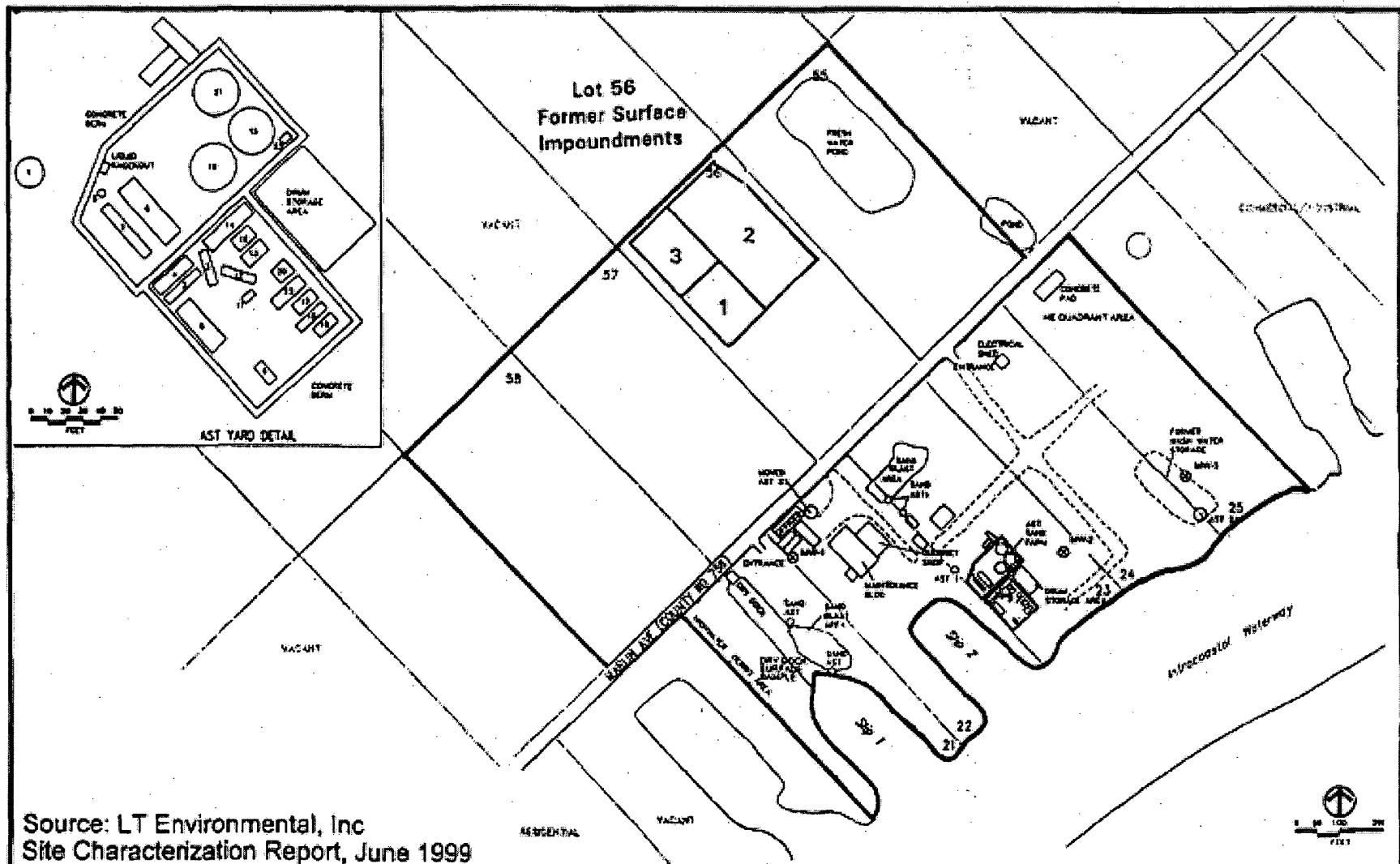


Figure 2
Facility Features Map

Gulfco Marine Maintenance
Freeport, Brazoria County, Texas
EPA ID. No. TXD055144539

ATTACHMENT 5

ENFORCEMENT ATTACHMENT TO THE ACTION MEMORANDUM FOR the "Gulfco Marine Maintenance Site" IS ENFORCEMENT SENSITIVE

Note: This document has been withheld as
Enforcement Confidential and is located in
Separate "CONFIDENTIALITY FILING" at
U.S. EPA, Region 6